

**COMPACT APPARATUS FOR NONINVASIVE MEASUREMENT OF GLUCOSE  
THROUGH NEAR-INFRARED SPECTROSCOPY**

**ABSTRACT**

A near IR spectrometer-based analyzer attaches continuously or semi-continuously  
5 to a human subject and collects spectral measurements for determining a biological  
parameter in the sampled tissue, such as glucose concentration. The analyzer  
includes an optical system optimized to target the cutaneous layer of the sampled  
tissue so that interference from the adipose layer is minimized. The optical system  
includes at least one optical probe. Spacing between optical paths and detection  
10 fibers of each probe and between probes is optimized to minimize sampling of the  
adipose subcutaneous layer and to maximize collection of light backscattered from  
the cutaneous layer. Penetration depth is optimized by limiting range of distances  
between paths and detection fibers. Minimizing sampling of the adipose layer greatly  
reduces interference contributed by the fat band in the sample spectrum, increasing  
15 signal-to-noise ratio. Providing multiple probes also minimizes interference in the  
sample spectrum due to placement errors.